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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,578	04/14/2004	Huang-Chen Guo	3313-1156PUS1	5022

2292 7590 05/08/2006

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
PEACE, RHONDA S	
ART UNIT	**PAPER NUMBER**
2874	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/823,578	Applicant(s) GUO ET AL.	
	Examiner Rhonda S. Peace	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/13/2006 has been entered.

Claim Objections

Claim 14 is objected to because of the following informalities: Claim 14 is not in proper grammatical format and must include terminal punctuation. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcuse et al (US 6385383) in further view of He (US 2002/0136525), and in still further view of Rasch et al (US 5838869).

Pertaining to claims 1-3 and 10, Marcuse et al (US 6385383) discloses a waveguide structure **150** comprising a polymer core **155** embedded within a cladding layer **165**, where the cladding layer **165** may be made of a polymer or another material, such as glass (Marcuse: column 4 lines 13-20, column 1 lines 24-27, Figures 4A and 4B). The use of a polymer within the core allows the core's index of refraction to vary as the temperature of the core is varied, thereby adjusting the level of attenuation achieved by the waveguide (Marcuse: column 3 lines 54-57). This waveguide structure **150**, as described by Marcuse et al, is described along the general format of a planar waveguide structure, *instead of the S-type waveguide claimed by the applicant.* However Marcuse et al also teaches other waveguide structures are also appropriate (Marcuse: column 3 lines 23-25). *Nevertheless, Marcuse et al does not specifically disclose the use of an S-type waveguide, nor does Marcuse disclose the teaching of leaving only one surface of the waveguide exposed.*

Further regarding claims 1-3 and 10, He (US 2002/0136525) discloses a variable optical attenuator using a double-bend S-type waveguide having an input **2** and an

output **3**, where a portion of the InP core (shown as **31** of Figure 3, and **7** of Figure 2) is left exposed so that metal electrodes **8** may be coupled directly to the layer (He: Figures 1-3, paragraphs 0020-0024). Also, He teaches the structure described by the applicant in claim 1, where the S-type waveguide **4** comprises two curved waveguide portions (hence, a "double-bend" waveguide), considered to be the first half of portion **7**, and the second half of portion **7**, where these two portions are connected, and further are connected to a linear inlet portion **5** and a linear outlet portion **6** (He: paragraphs 0021-0022, Figure 2). It *would have been obvious to one of ordinary skill in the art to use, as an alternative to waveguide structure* ***150****, an S-type waveguide as described by He including unique configuration comprising the linear input and output, for the reason of increasing the attenuation of light intensity possible within the waveguide.* It is well known within the art that a curved fiber or waveguide experiences heightened attenuation because as light travels around the curve in the fiber or waveguide, some of the light is lost to the cladding, thereby creating attenuation of the optical signal (paragraph 0033 of He). Therefore, since the goal of Marcuse et al is to create attenuation, it would be desirable to do so by various means, such as including a fiber or waveguide geometry that would encourage attenuation without needing an electrical signal, as suggested by He, and/or to vary the temperature of a layer within the waveguide or fiber. In addition, the keen use of geometry to aide in attenuation of the optical signal will also decrease the voltage signals needed to provide proper attenuation, thereby conserving the device's consumption of power. In addition, Marcuse et al also describes an attenuator and its method of use, where a polymer

cladding within a waveguide has an index of refraction that varies with temperature of the cladding material (Marcuse: column 1 lines 40-65). While Marcuse et al describes this attenuator as one with a polymer cladding, the attenuator may also use other waveguide structures, such as the polymer core waveguide described above, as Marcuse et al describes the polymer-core waveguide, as well as the attenuator, as optical structures that will facilitate the interruption of optical signals within a waveguide (Marcuse: column 1 lines 33-36). *However, He does not disclose embedding the core layer of the waveguide within a slot of the cladding layer such that only one surface is exposed.*

Further referring to claims 1-3 and 10, Rasch et al discloses various strip and channel waveguides, including a waveguide with a core layer **2** embedded within a slot in cladding material **1** (Rasch: Fig 5a, column 10 lines 38-39). Structures such as those shown in Figure 5 of Rasch et al are well known in the art, and offer several advantages when used to build multi-level wave-guiding structures. *Therefore, one of ordinary skill in the art would have been motivated to combine the above teachings of Marcuse et al and He with the teachings of Rasch et al to create an optical waveguide attenuator where the core layer of the waveguide is embedded within a slot of the cladding layer such that only one surface is exposed in order to provide more structural stability to the overall device, as now the core is protected on all but one side by the surrounding cladding layer, thereby decreasing the probability of waveguide damage or breakage, and also allows the electrodes to be coupled in an easier manner, as they can be coupled directly to the flat top surface of the device.* Moreover, the applicant has not

disclosed that embedding the core layer of the waveguide within a slot of the cladding layer such that only one surface is exposed solves any stated problem or is for any particular purpose and it appears the invention would perform equally well with a core layer with more than one exposed surface, and therefore it would have been obvious matter of personal preference to one of ordinary skill in the art to embed the core layer of the waveguide within a slot of the cladding layer such that only one surface is exposed.

Referring to claims 4 and 7-9, Marcuse et al, He, and Rasch et al disclose the device as previously described. Marcuse et al also discloses the use of both a heater **205** and a cooling device **210** located adjacent to the polymer layer **120**, in order to vary the temperature of the polymer layer **120** within the waveguide **200**, which is discussed within US 6385383 as a polymer cladding layer, but as explained above, also encompasses a polymer core layer (Marcuse: column 6 lines 7-18). As well, this heater and cooling device are in the form of chrome strips applied adjacent to the polymer material, acting as electrodes, and both are coupled to a voltage source so that the electrode-type heater and cooling device may heat or cool the polymer material to change the index of refraction of the polymer material (Marcuse: column 4 lines 27-38). As before, while Marcuse et al describes this waveguide system as one with a polymer cladding, the system may also use other waveguide structures, such as the polymer core waveguide described above where the electrode-type heater and cooler would then be coupled to the polymer core, as Marcuse et al describes the polymer-core waveguide, as well as the polymer-cladding, as optical structures that will facilitate the

interruption of optical signals within a waveguide (Marcuse: column 1 lines 33-36, column 3 lines 22-25).

Concerning claims 5 and 6, Marcuse et al, He, and Rasch et al disclose the device as previously described. Furthermore, Marcuse et al shows while the waveguide structure and corresponding attenuator have been previously described as a polymer core embedded within a cladding, as discussed above. However, in reference to waveguide system **150** of Figure 4A and 4B, the substrate **160** may act as a cladding layer composed of glass (Marcuse: column 3 lines 18-21), thereby allowing the cladding layer **165** to act as a buffer between the electrode-type chrome strips and the core layer. Marcuse et al also describes that materials similar to silica and doped silica may be used to create the cladding layer (Marcuse: column 1 lines 24-29), which at this time is considered to be a buffer. As it is well known in the art, silicon dioxide provides an excellent substitution for the silica or doped silica mentioned above, as it is both optically transparent, allowing optical signals to propagate through it, but also has a low dielectric constant around 4. A low dielectric constant material would be desirable buffer between the polymer core and electrode-type heater **205** and cooling device **210**, because it will allow a greater of flow of charge from electrode-type voltage suppliers to the core than would glass alone, as glass has a higher dielectric constant than silicon dioxide. In addition, materials with a higher dielectric constant, as well known in the art, are subject to more damage when in the presence of a strong electric field, therefore making the silicon dioxide with its lower dielectric constant a more preferable material to place between the core and electrode type as it is subject to less break down in the

presence of the electric field created by the electrode type heater **205** and cooling device **210**.

Speaking to claim 11, Marcuse et al, He, and Rasch et al disclose the device as previously described. As previously discussed, the S-type waveguide of He if formed using two continuously curved portions, both indicated within the region **7** of Figure 2 (paragraphs 0021-0022).

Referring to claims 12 and 13, Marcuse et al and He disclose the device as previously described. In addition, He discloses the S-type curve formed by portions enclosed within region **7** is a sinuous curve (He: paragraph 0021, Figure 2). As the trigonometric function cosine is the mathematical equivalent of the inverse sine function, the S-type waveguide of He is considered to be formed according to both the sine and cosine functions.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marcuse et al (US 6385383) in further view of He (US 2002/0136525), in further view of Rasch et al (US 5838869), and in further view of Howerton et al (US 2003/0228107).

Pertaining to claim 14, Marcuse et al, He, and Rasch et al disclose the device as described above. While He discloses the S-type waveguide is formed of a sinuous curve, He does not disclose a specific equation to describe the shape of the waveguide. Furthermore, neither Marcuse et al nor Rasch et al disclose a specific equation to describe the shape of an S-type waveguide. Howerton et al discloses a S-type waveguide where the shape of the S-curve is described by the following expression:

$$y(x) = (hx/L) - (h/2\pi) \sin (2\pi x/L)$$

where h is the height of the curve and L is the length of the curve, as can be seen in Figure 2 (Howerton: paragraphs 0009-0010). It would have been obvious to one of ordinary skill in the art to combine the teachings of Marcuse et al, He, Rasch et al, and Howerton et al, as Howerton et al gives a specific and well-known relationship that may be used to fabricate the S-type waveguide of He.

Response to Arguments

Applicant's arguments, see pages 5-8, filed 4/13/2006, with respect to the rejection(s) of claim(s) 1-13 under 35 U.S.C. §103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made under 35 U.S.C. §103(a), and has been detailed in the section above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Aoki et al (US 7035524) discloses an optical attenuator using an S-type waveguide buried within a substrate, where the refractive index of the core material is modified with the application of an electric field via an electrode placed on top of the wave-guiding layer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rhonda S. Peace

Rhonda S. Peace
Examiner
Art Unit 2874

John D. Lee

John D. Lee
Primary Examiner